UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WISCONSIN

NALCO COMPANY, Plaintiff, v. WISCONSIN PUBLIC SERVICE CORPORATION, d/b/a WESTON POWER PLANT (UNIT 3) Defendant.	Civil Action No.: 3:18-cv-279 **JURY TRIAL DEMANDED**

PLAINTIFF NALCO COMPANY'S COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Nalco Company ("Nalco") files this Complaint for Patent Infringement against Defendant Wisconsin Public Service Corporation, d/b/a Weston Power Plant (Unit 3) ("Defendant" or "WPSC"), and alleges as follows:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. § 1 *et seq*.

PARTIES

Nalco Company

2. Plaintiff Nalco Company is a Delaware corporation with its principal place of business at 1601 West Diehl Road, Naperville, Illinois 60563.

3. Nalco is a leading provider of environmental air protection technologies, including technologies for removing hazardous mercury from flue gases resulting from the combustion of coal in coal-fired power plants. Nalco's technologies deliver environmental, social and economic benefits to its customers.

4. Nalco is the exclusive licensee of United States Patent No. 6,808,692 (the "'692 Patent"), entitled "Enhanced Mercury Control in Coal-Fired Power Plants," which claims innovative methods to reduce hazardous mercury emissions from coal-fired power plants. Nalco has the right to sue for past, current and future infringement of the '692 Patent.

5. Nalco licensed the '692 Patent and developed the market for mercury removal technologies covered by the Patent.

6. Nalco also directly sells products for use by operators of coal-fired power plants to practice the methods claimed in the '692 Patent.

Defendant Weston Power Plant

7. On information and belief, Defendant WPSC is a Wisconsin corporation. It is the owner and operator of Weston Power Plant Unit 3. Weston Power Plant Unit 3 is a coal-fired power plant located at 2501 Morrison Ave., Rothschild, WI 54474.

8. Defendant WPSC has its principal offices, and corporate headquarters at 700 N. Adams Street, Green Bay, Wisconsin 54307.

9. Defendant WPSC has a registered agent for service, Corporate Creations Network, Inc., and may be served with this suit at the address of its registered agent, 4650 W. Spencer St., Appleton, WI 54914.

JURISDICTION AND VENUE

10. This Court has subject matter jurisdiction over this patent infringement action under 28 U.S.C. §§ 1331 and 1338(a). This action arises under the Patent Act, 35 U.S.C. § 1 *et seq*.

11. This Court has general and specific personal jurisdiction over Defendant because, on information and belief, Defendant is incorporated and has its principal place of business in this judicial district, has committed acts of infringement in this judicial district and has

systematic and continuous contacts with the State of Wisconsin and this judicial district because Defendant regularly transacts business and operates its power plant in the State of Wisconsin and in this judicial district. Defendant thereby has availed itself purposefully of the benefits and protections of the laws of the State of Wisconsin. Furthermore, this Court has personal jurisdiction over Defendant because, as described further below, Defendant has committed acts of patent infringement giving rise to this action within the State of Wisconsin and this judicial district and thus has established minimum contacts such that the exercise of personal jurisdiction over Defendant does not offend traditional notions of fair play and substantial justice.

12. Venue is proper in this judicial district under 28 U.S.C. §§ 1391 and 1400(b).

THE '692 PATENT

13. The allegations set forth in the foregoing paragraphs hereby are re-alleged and incorporated herein by reference.

The Technology

14. The '692 Patent originally was issued by the United States Patent and Trademark Office ("USPTO") on October 24, 2004. The '692 Patent subsequently was reexamined during an *Inter Partes* reexamination by the USPTO. Following a determination that the reexamined '692 Patent claims were allowable by the examiner, and after an affirmance of the allowability and validity of the reexamined claims by the Patent Trademark and Appeal Board, the USPTO issued an *Inter Partes* Reexamination Certificate for the '692 Patent on April 7, 2014. A true and correct copy of the '692 Patent and *Inter Partes* Reexamination Certificate are attached here as Exhibit A.

15. The invention of the '692 Patent is a major advance in environmental protection. Coal-fired power plants are a key part of the nation's electric power and are considered a vital part of the nation's economy. It is, therefore, important to make them as environmentally clean

as they can be – so much that the Federal Government offers hefty tax incentives for operating the plants in an environmentally friendly manner.

16. Specifically, the ’692 Patent permits the removal of mercury, a toxic pollutant, from the combustion flue gas created in coal-fired power plants before that gas enters the atmosphere. The ’692 invention has been adopted widely in the coal-fired power plant industry and has improved the quality of the nation’s air dramatically.

Operation Of Coal-Fired Power Plants

17. In a typical coal-fired power plant there is a furnace where the coal is burned to produce heat, and the heat from coal combustion then is used to produce steam, which then is used to drive turbines to generate electricity.

18. The area where the coal is burned is referred to as the combustion zone. The coal to be burned in a power plant is stored outside the furnace and then pulverized, dried, and delivered by conveyor belt to the combustion zone of the furnace, where it typically is injected into the combustion zone under air pressure using “coal injectors.”

19. The pulverized coal then combusts, providing the heat, which, in turn, creates steam to drive the generators. When the coal combusts in this combustion zone, a gaseous byproduct is created. The industry refers to this gas resulting from coal combustion as “coal combustion flue gas” or, in more abbreviated form, simply as “flue gas.” A true and correct copy of the Declaration of Andrew Fry (“Dr. Fry’s Declaration”) is attached here as Exhibit B.

20. The ’692 Patent uses the term “flue gas” in a manner consistent with the industry usage to refer to the gaseous product of coal combustion. As one example, Claim 19 in the Reexamination Certificate begins: “A method of treating flue gas that contains elemental mercury, wherein the flue gas is produced during the combustion of coal.” *See* Exhibit A.

21. An unusual aspect of describing the flow of flue gas in a power plant is the concept of "upstream" and "downstream." These terms are used to refer to the direction of flow of the flue gas. Thus, "downstream" refers to a direction further away from the furnace, and "upstream" refers to a direction closer to the furnace.

22. The flue gas, created in the combustion zone, begins in the combustion zone and then travels downstream past heat exchange equipment and pollution control filters, until it ultimately passes through the smokestack into the atmosphere.

23. One of the toxic pollutants in that flue gas is elemental mercury. Prior to the invention of the '692 Patent, removal of elemental mercury from flue gas was not practically feasible – either by filtering or other prior art methods.

The Process Claimed By The '692 Patent

24. The invention of the '692 Patent addresses the problem that it is difficult to filter and remove elemental mercury found in flue gas in coal-fired power plants.

25. Dr. Klaus Oehr, the inventor of the '692 Patent and a scientist with over thirty years of experience in chemical and electrochemical research and development, invented the process covered by the '692 Patent claims while working on the development of other pollution controls for flue gases. He determined that molecular bromine (Br_2) will combine with elemental mercury to form mercuric bromide ($HgBr_2$) and that mercuric bromide will precipitate into particles that can be more easily filtered out of the flue gas. A true and correct copy of Dr. Oehr's Declaration is attached here as Exhibit C. However, a problem is presented by the corrosive nature of the molecular bromine itself, which makes it impractical to insert it into the flue gas on its own. *Id.* at 3. The invention of the '692 Patent solved this problem. *See id*.

26. Dr. Oehr's inventive process, covered by the '692 Patent claims, was instead to inject a bromine precursor (i.e., a molecule that reacts to create bromine) into the flue gas, where, in the heat of the flue gas, the precursor reacts to create molecular bromine, which then can combine with elemental mercury in the flue gas to create mercuric bromide, a substance which readily can be filtered to prevent its introduction into the atmosphere. *See* Exhibit C at 3.

27. Claim 1 of the '692 Patent claims this innovative process:

> A method of treating coal combustion flue gas containing mercury, comprising:
>
> injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect oxidation of elemental mercury to a mercuric bromide and
>
> providing alkaline solid particles in said flue gas ahead of a particulate collection device, in order to absorb at least a portion of said mercuric bromide.

See Exhibit A.

28. A compound that breaks down, or changes, under heat is referred to as "thermolabile," and thus the type of bromine precursor Dr. Oehr contemplated being part of his invention is referred to as "thermolabile." *See* Exhibit C at 3.

29. The innovative process of the '692 Patent thus involves the injection of a molecular bromine precursor, which is thermolabile at flue gas temperatures, into the flue gas so that it will react to create molecular bromine, and then combine with the elemental mercury in the flue gas to form mercuric bromide. The mercuric bromide then can be filtered successfully from the flue gas.

How One With Ordinary Skill In The Art Would Understand Certain Terms In Claim 1 Of The '692 Patent

30. The '692 Patent uses the term "flue gas" in a manner consistent with the industry usage, to refer to the gaseous product of coal combustion. *See* Exhibit A (Claim 19 of the Reexamination Certificate). The flue gas, created in the combustion zone, begins in the

combustion zone and then travels downstream (the direction further away from the furnace toward the smokestack) past heat exchange equipment and pollution control filters, until it ultimately passes through the smokestack into the atmosphere. Within the usage in the industry, the gaseous product of coal combustion is referred to as "flue gas," wherever it is located.

31. Claim 1 of the '692 Patent does not restrict when the step of "injecting a bromide compound that is a thermolabile molecular bromine precursor into said [coal combustion] flue gas to effect oxidation of elemental mercury to a mercuric bromide" must be performed.

32. Claim 1 of the '692 Patent does not require that the step of "injecting a bromide compound that is a thermolabile molecular bromine precursor into said [coal combustion] flue gas to effect oxidation of elemental mercury to a mercuric bromide" be performed by injecting only a thermolabile molecular bromine precursor. The "injecting" step encompasses injecting a thermolabile molecular bromine precursor in combination with other compounds, including pulverized coal.

33. Moreover, the claims of the '692 Patent do not restrict the specific mechanism by which or the location within the coal-fired power plant at which the claimed "injecting" must occur.

34. As explained in the '692 Patent, "coal combustion flue gas" is the gas that is created during the combustion of coal.

35. The claim language of the '692 Patent does not impose any locational limit on where the bromine precursor must be injected into the flue gas.

36. The claim language of the '692 Patent does not impose any limitation that requires the injection of the bromine precursor be injection of only the bromine precursor, without the inclusion of any other compounds, such as pulverized coal.

37. The factual evidence is legion compelling the conclusion that a person with ordinary skill in the art (a "POSITA") would understand the term "flue gas" as used in Claim 1 of the '692 Patent to be the gas created during the combustion of coal, from the time of its creation until it passes out the smokestack, and not to be limited to such gas only when passing through a particular portion of the gas pathway downstream of the combustion zone.

38. Claim 1 itself supports that a POSITA would understand "flue gas" as used in Claim 1 to be as set forth in the preceding paragraph. The actual phrase in the body of Claim 1 is "said flue gas," where the term "said" is well understood in patent law to mean that the term that follows "said" has an antecedent basis. In Claim 1, the term "said flue gas" clearly refers back to the earlier reference in the preamble of the claim to "coal combustion flue gas containing mercury." *See* Exhibit A. Such "coal combustion flue gas containing mercury," referenced in the Claim, is created and exists in the furnace and from there downstream until it passes out the smokestack, and it is not limited to a later area that might be referred to colloquially as a "flue."

39. Other claims in the '692 Patent also provide intrinsic evidence that a POSITA would understand "flue gas" as used in the claims of the '692 Patent, including Claim 1, to refer to the gas resulting from combustion of coal, from the place of its creation and anywhere downstream.

40. Claim 21 provides: "A method of treating flue gas that contains elemental mercury, wherein the flue gas is produced during the combustion of coal." *See* Exhibit A. This language says the "flue gas" is "produced during the combustion of coal." It does not say that "flue gas" is "the gas produced during the combustion of coal" only while it is passing through a particular region downstream of the combustion zone.

41. The point made in the preceding paragraph is corroborated and further illustrated by extrinsic evidence as well. For example, U.S. Patents Nos. 6,206,685 and 6,471,506 B1, claim methods for reducing nitrogen gases in "combustion flue gas." True and correct copies of U.S. Patents Nos. 6,206,685 and 6,471,506 B1 are attached here as Exhibits D and E. These patents expressly teach that "combustion flue gas" forms immediately upon the introduction of the coal with the metal additive into the combustion zone of the furnace. *See id*. Figure 1 of the '685 Patent illustrates this with "22" identifying the "combustion zone" and with each line labeled "34" representing "combustion flue gas . . . that flows in a downstream direction from combustion zone 22." *See* Exhibit D.

42. The patents referenced above further teach that in the claimed methods for treating combustion flue gas "additives can be injected with the main fuel, in the main combustion zone" which includes "combustion flue gas 34." *See* Exhibits D and E. Thus, relevant prior art demonstrates that persons in the industry understand "flue gas" to refer to the combustion gas even in and around the combustion zone, not only some limited region downstream.

43. The specification is also evidence that a POSITA would understand "flue gas" to be the gas resulting from combustion of coal: "[a]ccording to the invention, there is provided a method of treating coal combustion flue gas, preferably that obtained after the 'superheater' section of a coal-fired plant." *See* Exhibit A. The use of the term "preferably" shows that the patent considers the treatment of coal combustion flue gas after it passes the "superheater" section as merely one possibility and that the patent also contemplates that the flue gas can be treated elsewhere.

44. The PTAB, in affirming the validity of the claims currently in the ’692 Patent, recognized that the claims of the ’692 Patent “are silent as to either temperature or location of treatment of the flue gas.” A true and correct copy of the file history of the ’692 Patent is attached here as Exhibit F.

45. The intrinsic record also contains various references cited on the face of the ’692 Patent – including the Galbreath article. A true and correct copy of the Galbreath article is attached here as Exhibit G.

46. The Galbreath article explains the process by which the coal combustion “flue gas” containing mercury at issue in the ’692 Patent is created. It makes clear that the coal combustion flue gas is not limited to any particular location, and it would be understood in this manner by a POSITA. *See* Exhibit G. In the caption of Figure 1 of Galbreath, it is made clear that flue gas is the gas that results from coal combustion. *See id*.

47. Similarly, U.S. Patent No. 6,372,187 to Madden was part of the file history and is intrinsic evidence. A true and correct copy of U.S. Patent No. 6,372,187 to Madden is attached here as Exhibit H.

48. Madden teaches a “system for removing mercury from combustion flue gases.” *See* Exhibit H. Specifically, it expressly teaches that “hot flue gases 42, containing contaminants such as mercury, are generated in the boiler 24 furnace and rise through upper furnace region 28.” *See id*. A POSITA considering Madden would also understand flue gas to exist at the combustion zone and downstream.

49. Standard technical dictionaries also make clear that the term “flue gas” is defined broadly to mean simply the gaseous combustion products of a furnace. These include: McGraw-Hill Dic’y of Scientific & Technical Terms, 5th Edition, 1994, p. 779 (defining “flue gas” as

"gaseous combustion products from a furnace") (a true and correct copy of which is attached here as Exhibit I) and Academic Press Dic'y of Science & Technology, 1992, p. 853 (defining "flue gas" as "the gaseous combustion products generated in a furnace") (a true and correct copy of which is attached here as Exhibit J). A POSITA considering these dictionary definitions would understand flue gas to exist at the combustion zone and downstream.

50. Further, Stulz and Kitto, Steam: Its Generation and Use 40th Edition, 1992, is a well-known, widely used publication in the industry which would be a standard text relied upon by a POSITA. A true and correct copy of *Steam* is attached here as Exhibit K. It specifically explains that "flue gas" means "products of combustion." *See* Exhibit K at 3. This publication is further evidence supporting the factual allegation that coal combustion flue gas would be understood by a POSITA to mean the gas created by the combustion of coal. *Id.*

51. Dr. Andrew Fry is a Professor of Chemical Engineering at the University of Utah. *See* Exhibit B. He has spent most of his career studying technologies relating to coal combustion, gasification, and power generation, including extensive study of various mercuric reduction processes and technologies used within the coal-fired power plant industry. *Id.* Dr. Fry is of the opinion that a POSITA readily would understand the '692 Patent's use of the term "coal combustion flue gas" to mean the gas that is produced during coal combustion; he also opines that this meaning is not limited to gases found in any specific location of the furnace. *See id*.

52. Dr. Fry also is of the opinion that a POSITA would understand readily that such coal combustion flue gas exists throughout the combustion zone of an operating coal combustion furnace or boiler. *See* Exhibit B.

53. As supported by Dr. Fry's opinion and the other references cited above, it is clear as a factual matter that a POSITA would understand that "flue gas" as used in Claim 1 of the '692 Patent is present in the entire furnace area of an operating coal-fired power plant and then downstream.

54. Further, flue gas can be recirculated back into the furnace – thus, flue gas does not lose its characterization as being "flue gas" when it leaves a specific portion of the coal-fired power plant. *See* Exhibit B.

55. The factual allegations above regarding the manner in which a POSITA would understand the term "flue gas" as used in the '692 Patent is corroborated by articles which describe flue gas as being present throughout the gas stream path in a furnace. One article, "Sorbent for Mercury Removal from Flue Gas," by Granite, Penline & Hargas ("Granite"), describes flue gas as emerging from the furnace or combustion zone and moving throughout various locations in the coal-fired power plant. A true and correct copy of Granite is attached here as Exhibit L. A POSITA considering the Granite article also would understand flue gas to exist at the combustion zone and downstream, as confirmed by Dr. Fry. *See* Exhibit B.

56. Nalco employees Dr. Bruce Keiser and Mr. John Meier are engineers with sufficient experience to opine as to the understanding of a POSITA. Each has provided a declaration supporting Nalco's position on how a POSITA would understand "said flue gas." True and correct copies of the Declarations of Dr. Keiser and Mr. Meier are attached here as Exhibits M and N. Each opines that the term coal combustion "flue gas" as used in Claim 1 would be understood by a POSITA to be the gas that is produced from coal combustion. *Id.* Each further opines that a POSITA would understand that coal combustion flue gas is generated

through coal combustion and is present throughout the combustion zone of an operating coal furnace or boiler. *Id*.

57. The inventor, Dr. Oehr, also confirms these points, and he also confirms he did not intend any narrower meaning of the term coal "flue gas" in his patent. *See* Exhibit C.

58. It is clear, and abundantly corroborated, that a POSITA would understand the term "said flue gas" in Claim 1 to refer to the "coal combustion flue gas containing mercury" at any place it exists in the furnace or downstream in the stack, including in the combustion zone where it is created.

59. Intrinsic and extrinsic evidence also exists in abundance to support the allegation that the term "injecting" as used in Claim 1 of the '692 Patent would be understood by a POSITA not to be limited to injecting solely a bromine precursor, but to include injecting the bromine precursor mixed with other materials, including pulverized coal.

60. Indeed, Dr. Oehr's early work on the '692 invention involved using a process of mixing the bromine precursor with pulverized coal and causing this combination to be introduced into the flue gas at the combustion zone. *See* Exhibit C. This fact would support a POSITA having the understanding of "injecting" summarized in the previous paragraph.

61. A POSITA would understand "injecting" to mean just what it is defined to mean in technology dictionaries and other relevant extrinsic evidence at the time. As an example, one commonly used dictionary defines "injecting" in this context to mean "the introduction of fuel, fuel and air, . . . or other substance into [a] . . . combustion chamber." McGraw-Hill Dic'y of Scientific & Technical Terms, Fifth Edition, 1994, p.779 (Exhibit I).

62. Dr. Fry also is of the opinion that a POSITA would understand that "injection" of a bromine precursor into "flue gas" occurs regardless of whether the compound being injected

has been "mixed" with coal before injection. *See* Exhibit B. He opines that a POSITA would not read the teachings of the '692 Patent to limit the claimed injecting step to a bromine precursor alone or excluding a mixture with coal. *Id.* Dr. Fry notes further that his opinion in this regard is supported and corroborated by numerous other patents relevant to the art of the '692 Patent that expressly teach the treatment of combustion flue gas through the injections of additives along with coal or other fuels. *Id.*

63. Strong extrinsic evidence also supports that a POSITA would understand the term "injecting" in this manner. For example, U.S. Patents Numbers 6,206,685 and 6,471,506 B1, discussed above, explain in their claimed method for treating "combustion flue gas" that "additives can be injected with the main fuel, in the main combustion zone." *See* Exhibits D and E. Thus, these patents, as explained by Dr. Fry, support a conclusion that a POSITA would understand the term "injecting" a bromine precursor into the flue gas to include mixing it with the fuel (i.e., the coal) and then injecting the additive with the fuel into the combustion zone that contains the flue gas, consistent with the earlier illustration from the intrinsic '685 Patent. *See* Exhibit B.

64. Dr. Fry and others also cite additional intrinsic evidence as support of a POSITA's understanding of "injecting." The Madden patent, for example, is highly instructive in this regard. *See* Exhibits B and H. It is directed at an invention for removing mercury from the flue gas of coal-fired power plants. *See* Exhibit H. The patent explains how this is done: "[s]mall amounts of alkaline sorbents are thus injected into the flue gas stream at a relatively low rate." *Id*. Elsewhere the patent explains the invention includes "the injection of any alkaline sorbent 14 into a flue gas 42, 44, 46 stream anywhere from the boiler 24 to the exit stack 36." *Id.*

65. Thus, the Madden patent uses virtually the same language as Claim 1 of the '692 Patent – an additive is "injected" into the "flue gas." *See* Exhibit H. And Madden makes it clear in using this term that it considers "injecting . . . into flue gas" to be a term that includes introducing the additive mixed with fuel into the flue gas in the combustion zone, in addition to referring to introducing the additive into the flue gas at places downstream of the combustion zone. *Id.* Thus, Madden demonstrates that a POSITA would understand the term "injecting" in Claim 1 to be a term that encompasses adding it to the flue gas by injecting it: (a) with the fuel (i.e., coal) into the furnace; (b) by itself, downstream in the region of the '692 preferred embodiment; (c) or even somewhere later downstream. In Figure 2, Madden shows the alkaline sorbent being prepared in the box 12. *Id.* It then shows that the transmission of that sorbent along with the fuel into the furnace, or transmission of the sorbent into the stack area near the boiler, or transmission of the sorbent at places downstream in the stack all are considered to be "injecting" the sorbent "into the flue gas." *Id.*

66. Figure 2 of Madden shows that each of these places is considered by Madden to be "injecting" into the "flue gas," including mixing the sorbent with the fuel 28 and injecting them together into the furnace 26. *See* Exhibit H. Madden demonstrates that a POSITA would understand "injecting" as used in Claim 1 to encompass injecting the bromine precursor along with pulverized coal. *Id.*

67. Dr. Oehr also opines that he did not intend his invention to be limited to any specific mechanism or location at which injecting into flue gas must occur. *See* Exhibit C. Dr. Oehr's explanation of his initial conception of his claimed invention helps to demonstrate that an additive can be "inject[ed] . . . into flue gas" even if "mixed" with coal before the injection occurs. *Id.* Indeed, his initial work on his invention specifically involved mixing compounds

with coal and injecting the mixture into the furnace via coal injectors in the area of the combustion zone. *Id.*

68. Dr. Keiser and Mr. Meier also have opined on this issue of how a POSITA would understand the term "injecting" in Claim 1. *See* Exhibits M and N. Both Dr. Keiser and Mr. Meier opine that a POSITA would understand readily that the injection of a mixture of an additive such as calcium bromide and pulverized coal into an operating furnace or boiler would constitute injection of those substances into flue gas. *Id.* Each also opines that a POSITA of the '692 Patent would be generally familiar with a variety of compounds used to treat various characteristics of combustion flue gas, where these compounds are injected into flue gas along with fuel through a coal injector or burner. *Id.*

69. The intrinsic and extrinsic evidence, plus the related expert and inventor testimony, collectively demonstrate that a POSITA would understand "injecting," as used in Claim 1, to include a process that injects the bromine precursor at the same time as and along with the pulverized coal.

70. Thus, the innovative process of the '692 Patent involves the injection of a molecular bromine precursor, which is thermolabile at flue gas temperatures, into the flue gas, wherever that flue gas is located, so that it will react to create molecular bromine and then combine with the elemental mercury in the flue gas to form mercuric bromide. The mercuric bromide then can be filtered successfully from the flue gas. This prevents the mercury from polluting the atmosphere.

DEFENDANT'S INFRINGING SYSTEM

71. The allegations set forth in the foregoing paragraphs are hereby re-alleged and incorporated herein by reference.

Defendant's Introduction Of, And Continued Use Of, The Infringing Mercury Removal Process

72. In 2015 Defendant requested and received from the Wisconsin Department of Natural Resources ("WDNR") a Research and Testing Exemption (RTE) to test a Refined Coal Demonstration Project on Units 3 and 4 at Defendant's Weston Power Plant. This production of Refined Coal uses a process and materials obtained by Defendant from Chem-Mod, LLC or a related affiliate.

73. The RTE Request by Defendant explained that the scope of the work included the installation of temporary fuel additive equipment, which apply Refined Coal additives to coal prior to crushing. The Refined Coal would then be processed using the plant's existing coal material handling systems, test burned in the boilers of Units 3 and 4, and mercury-related pollutants (along with other pollutants) would be extracted from the flue gas using the existing emissions control systems.

74. Refined Coal, as referred to in the RTE Request by Defendant, and as used by Defendant, is conventional coal treated with the Chem-Mod Process, which is a mercury-removal treatment that involves adding additives to coal before the coal is injected into a power plant furnace. A true and correct copy of Chem-Mod Report "Production of Refined Coal using the Chem-Mod Process" is attached here as Exhibit O, and a true and correct copy of Chem-Mod PowerPoint Presentation "Mercury Emission Control Utilizing the Chem-Mod Process" is attached here as Exhibit P. Each confirms the Chem-Mod Process employs additives that are referred to as the Chem-Mod Solution, and that the coal with the Chem-Mod Solution added to it is referred to as Refined Coal. *Id*. *See also* a true and accurate copy of certain relevant portions of the Chem-Mod website describing the Chem-Mod Solution and accessed through the URL www.chem-mod.com., attached here as Exhibit Q.

75. The Chem-Mod Solution includes as additives a product Chem-Mod calls "MerSorb" and a separate product Chem-Mod calls "S-Sorb." *See* Exhibits O, P, and Q. *See also*, a true and correct copy of Chem-Mod's Materials Safety Sheet for MerSorb attached here as Exhibit R and a true and correct copy of Chem-Mod's Materials Safety Sheet for S-Sorb attached here as Exhibit S.

76. MerSorb is a mixture of calcium bromide, which is a molecular bromine precursor, and water. *See* Exhibits O and R. Calcium bromide is a thermolabile molecular bromine precursor. *Id*.

77. S-Sorb is a dry powdered sorbent made from raw feed materials typically used in the cement industry. *See* Exhibits O and S. S-Sorb is a mineral composite of calcium silicate components and other calcium compounds. *Id*. It is an alkaline material. *Id*.

78. The Chem-Mod Process involves making Refined Coal by applying the Chem-Mod Solution, which includes MerSorb and S-Sorb, to coal, typically before it is pulverized, and before it is injected into the furnace. *See* Exhibits O, P, and Q.

79. When injected into the flue gas, the MerSorb (calcium bromide), which is thermolabile, will decompose thermally, and the resulting free bromine (Br) will react with the elemental mercury in the flue gas to produce oxidized mercuric compounds (e.g., mercuric bromide) which then will react with alkaline particles from S-Sorb to form mercury-bearing particles which are then filtered from the flue gas. *See* Exhibits O and P.

80. In 2016, after the testing proved to be successful in using Refined Coal to reduce mercury and acid gas emissions, Defendant sought to add the Refined Coal Project to its plant permanently, and it sought and received from the WDNR an expedited construction permit for the permanent construction of a Refined Coal Project at both Units 3 and 4, gaining approval to

commence construction prior to issuance of the construction permit. Again, Defendant's application explained that the Refined Coal Project would apply additives to the coal for plant Units 3 and 4 to reduce emissions of pollutants, including mercury.

81. The Refined Coal process equipment utilized by Defendant includes two S-Sorb storage silos, a MerSorb storage tank, a new mixer/crusher for mixing the sorbents with coal, and new compressors and blowers for pneumatic transportation of the MerSorb and S-Sorb.

82. Defendant's 2016 application explained that by working with Chem-Mod or its affiliate to incentivize the production and use of refined coal to reduce air emissions from coal-fired power plants, Defendant would receive financial benefits from tax credits available to Chem-Mod once the system was in service at Defendant's plant.

83. The 2016 application also explained that Defendant planned for these long-term changes, which incorporate the Chem-Mod Process utilizing Refined Coal, to continue in operation through at least 2021.

84. On information and belief, the Defendant obtains its Refined Coal directly from a provider on-site operated by Chem-Mod or an affiliate that purchases the coal from the Defendant, treats it by applying MerSorb and S-Sorb, and sells this Refined Coal back to the Defendant on-site.

85. Defendant then injects the Refined Coal into the furnace, causing the thermolabile bromine precursor of the MerSorb to be injected into the flue gas, where it thermally resolves to bromine which reacts with the mercury in the flue gas to form mercuric bromide. That mercuric bromide then combines with the alkaline particles provided by the S-Sorb, and then is filtered out of the flue gas. Indeed, Chem-Mod, or an affiliate providing the Refined Coal to Defendant,

contractually requires that Defendant actually combust the Refined Coal. *See* Exhibits O, P, Q, R, and S.

Defendant's Use Of The Chem-Mod Process Literally Infringes Claim 1 Of The '692 Patent

86. As noted earlier, Claim 1 provides as follows:

> A method of treating coal combustion flue gas containing mercury, comprising:
>
> injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect oxidation of elemental mercury to a mercuric bromide and
>
> providing alkaline solid particles in said flue gas ahead of a particulate collection device, in order to absorb at least a portion of said mercuric bromide.

Exhibit A.

87. Defendant's use of the Chem-Mod Process in its power plant satisfies every element of Claim 1 of the '692 Patent.

"A method of treating coal combustion flue gas containing mercury"

88. Defendant's own request for permission to install the Chem-Mod process explained that it is a method of treating coal combustion flue gas containing mercury. To the extent the preamble of Claim 1 is a limitation, Defendant's statements to public authorities concede this limitation is met.

"injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect oxidation of elemental mercury to a mercuric bromide"

"bromide compound that is a thermolabile molecular bromine precursor"

89. MerSorb is a thermolabile molecular bromine precursor. It is comprised of calcium bromide and water. *See* Exhibit R. Calcium bromide is a thermolabile bromine precursor. *See* Exhibits O and R.

"injecting a . . . thermolabile bromine precursor into said flue gas"

90. The Chem-Mod Process, carried out by Defendant, includes the step of injecting the MerSorb, which is a thermolabile bromine precursor, into the flue gas. *See* Exhibits O and R.

91. After being treated with MerSorb and S-Sorb and mixed thoroughly at Defendant's plant, the Refined Coal then is fed by Defendant into the combustion zone of the furnace (which, as explained above, contains flue gas) via coal injectors.

92. When a coal combustion furnace is operating, the coal component of the Refined Coal combusts to create coal combustion flue gas. *See* Exhibit O. This coal combustion flue gas is present throughout the operating coal combustion furnace, including the site at which the Refined Coal, containing the MerSorb and S-Sorb, is injected by Defendant via coal injectors into the operating coal-fired power plant. *Id.* Thus, when the Refined Coal is injected via coal injectors into Defendant's operating coal-fired power plant, the MerSorb additive component of the Chem-Mod Solution Mixture necessarily is "injected into . . . coal combustion flue gas."

93. Moreover, when a coal combustion furnace is operating, gases and other materials injected via coal injectors flow under a pressure differential into areas of the coal combustion furnace beyond the areas of the furnace in which the coal component of the Refined Coal combusts and into additional areas of the furnace in which the coal combustion flue gas exists. *See* Exhibits O, P, and Q. Thus, this is an additional mechanism by which the MerSorb additive component of the Refined Coal is "injected into . . . coal combustion flue gas."

94. As flue gas is present throughout the combustion zone, as well as further downstream from the combustion zone, infringement occurs whether the precursor is injected in the combustion zone where it immediately reaches flue gas or whether the precursor first flows under a pressure differential downstream into a later area of the plant where flue gas is also present. In either event, the bromine precursor is still considered to be "injected" into the "flue

gas," as those terms in Claim 1 would be understood by a POSITA. This is true even though the MerSorb by itself is not injected alone into the flue gas, which is not a requirement a POSITA would understand to be imposed by Claim 1.

95. Chem-Mod's publications about the Chem-Mod Solution depict the injection of the Refined Coal – including both MerSorb, S-Sorb, and pulverized coal – into a coal-fired power plant via "coal injectors." *See* Exhibits O, P, and Q. Defendant carries out this injection step in its power plant as part of its use of the Chem-Mod Process.

96. Chem-Mod similarly describes on its website that in the Chem-Mod Solution, the mixture of MerSorb and coal is "introduced [to a coal furnace] through the burners." *See* Exhibit Q.

97. Even if the Court were to construe the limitation "injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect oxidation of elemental mercury to a mercuric bromide" narrowly to require that the claimed "injecting" is limited only to injecting a thermolabile molecular bromine precursor as opposed to injecting a thermolabile molecular bromine precursor mixed with other additives and/or coal (which Nalco contends would be an incorrect construction), then the Chem-Mod Solution nevertheless would infringe the claims of the '692 Patent under the doctrine of equivalents.

98. MerSorb is a bromide compound that is a thermolabile molecular bromine precursor which effects oxidation of elemental mercury to a mercuric bromide. Injecting MerSorb mixed with other additives and/or coal into a coal-fired power plant is at least equivalent to injecting a bromide compound that is a thermolabile molecular bromine precursor into coal combustion flue gas. The function of the claim element injecting a bromide compound that is a thermolabile molecular bromine precursor into coal combustion flue gas is to make the

thermolabile molecular bromine precursor available to decompose at temperatures typical of coal combustion flue gas. When MerSorb mixed with other additives and/or coal is injected into an operating coal-fired plant, MerSorb is available to decompose at temperatures typical of coal combustion flue gas. This is at least substantially the same as the function of the literal claim element.

99. The way in which the claim element requiring injecting a bromide compound that is a thermolabile molecular bromine precursor into coal combustion flue gas performs this function is by introducing the bromide compound such that it interacts with the coal combustion flue gas and decomposes at temperatures typical of coal combustion flue gas to molecular bromine, which oxidizes elemental mercury. When MerSorb mixed with other additives and/or coal is injected into a coal-fired power plant, a bromide compound that is a thermolabile molecular bromine precursor interacts with the coal combustion flue gas and decomposes at temperatures typical of coal combustion flue gas to molecular bromine, which oxidizes elemental mercury. This is at least substantially the same as the way the function is performed by the literal claim element.

100. The result achieved by the claim element requiring injecting a bromide compound that is a thermolabile molecular bromine precursor into coal combustion flue gas is the oxidation of elemental mercury to a mercuric bromide. When MerSorb mixed with other additives and/or coal is injected into a coal-fired plant, the MerSorb decomposes to molecular bromine, which effects oxidation of elemental mercury. This is at least substantially the same as the literal claim element.

101. Also, even if the Court were to construe the limitation "injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect

oxidation of elemental mercury to a mercuric bromide" narrowly to require that the claimed "injecting" occur at a particular time or location in a coal-fired plant, (which Nalco contends would be an incorrect construction), then the Chem-Mod Process nevertheless would infringe the claims of the '692 Patent under the doctrine of equivalents.

102. MerSorb is a bromide compound that is a thermolabile molecular bromine precursor. When introduced into coal combustion flue gas, it decomposes to molecular bromine which effects oxidation of elemental mercury to a mercuric bromide. Even if the limitation "injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect oxidation of elemental mercury to a mercuric bromide" narrowly required the claimed "injecting" occur at a particular time or location, the function of the "injecting" step is to cause MerSorb, which is a thermolabile bromide compound, to be introduced to the coal combustion flue gas where it can decompose, and the resulting molecular bromine can oxidize the elemental mercury. Thus injecting MerSorb at some different place in the plant, provided it still causes the bromide compound to decompose in the coal combustion flue gas and oxidize the elemental mercury, is performing at least substantially the same function as the literal claimed element.

103. The way in which the claimed element works, if literally construed to be limited as set forth in the prior paragraph (which Plaintiff contends would be error) is to cause the MerSorb bromine compound, which is thermolabile, to come into the presence of the coal combustion flue gas where that gas is of sufficient temperature to effect decomposing of the bromine compounds into molecular bromine which then can oxidize the elemental mercury. Thus, even if the limitation "injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect oxidation of elemental mercury to a mercuric

bromide" narrowly required the claimed "injecting" occur at a particular time or location, injecting the bromine compound at some different location, which still achieves the decomposition of the bromine compound and the oxidation of the elemental mercury by the resulting molecular bromine, is still performing the function of the claimed step in the substantially the same way.

104. The result of the claimed "injecting" element is to effect the oxidation of mercury by the molecular bromine resulting from the decomposition of the injected bromide compound. Even if the limitation "injecting a bromide compound that is a thermolabile molecular bromine precursor into said flue gas to effect oxidation of elemental mercury to a mercuric bromide" narrowly required the claimed "injecting" occur at a particular time or location, the result of injecting it elsewhere in a location that still effected the oxidation of elemental mercury by the molecular bromine resulting from the decomposition of the bromide compound would still achieve substantially the same result.

"effect oxidation of elemental mercury to a mercuric bromide"

105. At high temperatures typical of a coal-fired power plant, the MerSorb and S-Sorb additives used in the Chem-Mod Solution react with elemental mercury in coal combustion flue gas. *See* Exhibits O, P, and Q. Specifically, the MerSorb effects the oxidation of elemental mercury to form mercuric bromide. *Id*.

"providing alkaline solid particles in said flue gas ahead of a particulate collection device, in order to absorb at least a portion of said mercuric bromide."

"providing alkaline solid particles in said flue gas ahead of a particulate collection device"

106. The Chem-Mod Process also involves the step of providing alkaline solid particles in said flue gas ahead of a particulate collection device, in order to adsorb at least a

portion of said mercuric bromide as recited in claim 1 of the ’692 Patent. *See* Exhibits R, S, and T.

107. The Chem-Mod Solution includes a second Chem-Mod Solution additive called S-Sorb, which includes a mixture of alkaline solid particles. *See* Exhibits O, P, Q, and S. Defendant applies the S-Sorb to the mixture of coal and MerSorb as part of the Refined Coal before the Refined Coal is injected into the furnace. *See id*.

108. Injecting the alkaline particles in the S-Sorb into the flue gas at the furnace undeniably is providing them ahead of the particulate collection devices employed by Defendant in its power plant.

“absorb at least a portion of said mercuric bromide”

109. Treating the coal with the Chem-Mod Solution to make Refined Coal, and injecting the Refined Coal into the furnace, permits the control of mercury by effecting oxidation of elemental mercury into mercuric bromide, which then reacts with the alkaline solid particles from the S-Sorb, which then can be removed by filtering. *See* Exhibits O, P, and Q.

110. In the Chem-Mod Solution, the mercuric bromide adsorbs onto alkaline solid particles in the coal combustion flue gas. *See* Exhibits O, P, and Q. As a result, mercury, in the form of mercuric bromide, is removed as part of solid particles instead of being emitted to the atmosphere with coal combustion flue gas. *Id.*

111. Chem-Mod’s website explains that “[t]he Chem-Mod Solution’s sorbents are also reagents, meaning their addition to the boiler results in a chemical reaction. Specifically, the Chem-Mod Solution sorbents react with the contaminant gases and produce a compound which can be captured in the fly ash and bound in a ceramic-like matrix.” *See* Exhibit Q.

112. As Chem-Mod itself has described, "in the case of the Chem-Mod Solution, sorbents are used to absorb toxic gases such as mercury . . . that are emitted during the combustion of coal." *See* Exhibit Q.

113. Chem-Mod's materials promoting use of the Chem-Mod Solution explain that "[w]hen the mixture heats up in the boiler, mercury, nitrogen oxides, and sulfur dioxide react with the Chem-Mod chemicals." A true and correct copy of a presentation by Douglas C. Howell, CFO of A.J. Gallagher, dated April 11, 2012, to potential investors, describing the Chem-Mod Solution, is attached as Exhibit T. "As it cools, a chemical bonding occurs and captures the mercury, etc. and becomes part of the ash rather than released into the air." *Id*.

COUNT I – DIRECT INFRINGEMENT OF THE '692 PATENT

114. The allegations set forth in the foregoing paragraphs are hereby re-alleged and incorporated herein by reference.

115. Plaintiff Nalco is the exclusive licensee of the '692 Patent.

116. Defendant literally practices each and every element of at least Claim 1 of the '692 Patent, and thus infringes Claim 1 and is liable for that infringement.

117. In the alternative, if any element of Claim 1 is considered not to be literally met, it is nonetheless met equivalently, as the '692 Patent performs the substantially same function (i.e., removing mercury from coal combustion gas using bromine derived from a thermolabile bromine precursor broken down by the heat of the gas), in substantially the same way (introducing the thermolabile bromine precursor into the gas to decompose and form molecular bromine), with substantially the same result (i.e., the elemental bromine combines with elemental mercury to produce a compound that absorbs to alkaline particles removable by particulate filters) as Defendant's process. Accordingly, if not found to literally infringe the '692 Patent,

Defendant's process nevertheless infringes under the doctrine of equivalents and Defendant is fully liable for such infringement.

118. Upon information and belief, Defendant's acts of infringement have been willful and deliberate, with full knowledge of Nalco's rights in the '692 Patent.

119. By virtue of Defendant's willful and deliberate infringement, this is an "exceptional case" within the meaning of 35 U.S.C. § 285.

JURY TRIAL DEMANDED

Nalco hereby requests a trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

PRAYER FOR RELIEF

Nalco respectfully requests that the Court find in its favor and against Defendant, and that the Court grant Nalco the following relief:

A. an adjudication that Defendant has infringed the '692 Patent;

B. an award of damages to be paid by Defendant adequate to compensate Nalco for Defendant's past infringement of the '692 Patent and any continuing or future infringement through the date such judgment is entered, including prejudgment and post-judgment interest, costs, expenses, and an accounting of all infringing acts including, but not limited to, those acts not presented at trial;

C. an injunction preventing further infringement by Defendant;

D. an award of treble damages under 35 U.S.C. § 284;

E. an award to Nalco of such attorney fees and costs as it shows itself to be entitled to by law; and,

F. an award to Nalco of such further relief at law or in equity as the Court deems just and proper, including, but not limited to costs, fees, expenses, interest, and/or attorney fees.

Dated: April 18, 2018

Respectfully submitted,

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